GEOGRAPHICAL RECORD.

AMERICAN GEOGRAPHICAL SOCIETY.

TRANSACTIONS OF THE SOCIETY, FEBRUARY, 1905.—A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, February 21, 1905, at 8.30 o'clock P.M.

Vice-President Moore in the chair.

The following persons, recommended by the Council, were unanimously elected:

To Honorary Membership: Sir John Murray.

To Fellowship:

Harry Skull.	Robert C. Geer.
N. A. Bengtson.	John B. Uhle.
Trenor L. Park.	Julian Hastings Granbery.
T. T. Eckert, Jr.	Stephen J. Meeker.
Antonio Reynes.	Howard Van Sinderin.
Franklin Delano Roosevelt.	Paul G. Thebaud.
Miss Helen L. Gennert.	Philip Ruprecht.
Willis Fletcher Johnson.	H. E. Heath.
J. Henry Townsend.	Alain C. White.
Robert Olyphant.	J. Culver Hartzell.
John H. J. Stewart.	Robert Peet Skinner.
Clement S. Dunning.	James P. Hall.
Rev. John Howard Raven.	Fullerton Merrill,
T. Tileston Wells.	Seth B. Robinson.
W. P. Hardenbergh.	Edward True Wing.
William Church Osborn.	John E. Whitaker.
Madison Grant.	William H. White.
Frederic de P. Foster.	Stephen Loins.
William T. Blaine.	George R. McDougell.
William Lee Howard.	George C. Yeisley, D.D.
William R. Powell.	Peter Zucker.

The Chairman then introduced the speaker of the evening, Mr. Adolphe F. Bandelier, who addressed the Society on The Region of Lake Titicaca. Stereopticon views were shown.

On motion, the Society adjourned.

AMERICA.

RECONNAISSANCE WORK IN MEXICO.—Mr. Robert T. Hill, accompanied by Dr. E. O. Hovey, of the American Museum of Natural History, and assistants, has gone to Mexico to study the geography and geology of the Western Sierra Madre. This reconnaissance work will continue Mr. Hill's investigations upon the mountains and deserts of the Southern Cordilleras, and also Dr. Hovey's studies of volcanic phenomena. The expedition is fully equipped for topographic, photographic, and geologic work.

GREAT BRITAIN ANNEXES A SMALL ISLAND.—According to the *Geographische Zeitschrift* (1904, p. 581) the British annexed in August last the little Aves Island,

in the Caribbean Sea, west of Guadeloupe, in 15° 38′ N. Lat. and 63° 36′ W. Long. It is a low island, rising from a great depth, and has been little known. It stands 12 to 14 feet above sea-level, is visible only near at hand, and is, therefore, a danger to navigation. Its length is only about 4,000 feet. American vessels have taken away most of its guano deposits, and the only value of the island appears to be an anchorage on its southwest side in six fathoms of water.

MARINE BIOLOGICAL LABORATORY AT TORTUGAS.—One of the research projects authorized by the Carnegie Institution was the establishment of a laboratory for the study of the marine biology of the tropical Atlantic, using Tortugas, Fla., as a land station. Mr. Alfred G. Mayer is the director of the work. The main laboratory and a small laboratory were erected in July last. A staunch sea-going vessel of light draft, capable of making headway against the strong currents of the coral reefs and the Gulf Stream, was launched at East Boothbay, Me., in August. She has accommodations for seven men, is equipped with a full set of trawls, dredges, nets, and other apparatus for the study of marine life, and the cabin has ample room for such laboratory work as can be accomplished at sea. The director says (Year Book No. 3 of the Carnegie Institution) that the vessel has proved to be an able yacht, and displays her best qualities in heavy weather. Every encouragement is to be given to eminent naturalists to pursue their investigations at the laboratory.

THE IROQUOIS BEACH IN ONTARIO.—Glacial Lake, Iroquois, was an ice-dammed lake formed when the continental glacier blocked the St. Lawrence outlet and caused the water to rise to the level of the divide at Rome, New York. Its shore-lines are very distinct on both the Canadian and the American sides, where they were early recognized as elevated beaches even by untrained travellers. Much study has been given to these shore-lines of the ancient glacial lakes, and in New York, largely as a result of Dr. Vibbert's careful work, they have been accurately mapped. On the Canadian side the beaches have been less carefully studied, and therefore a recent paper by Prof. A. P. Coleman (Bull. Geol. Soc. Amer., Vol. 15, 1904, pp. 347–368), in which the Canadian beaches are carefully mapped, and described in some detail is a distinct contribution to the literature of the large glacial predecessor of Ontario.

The beach is readily traced from near Hamilton, northeastwardly to the Trent River, but is not found beyond Havelock on the north side of the Trent. In its eastern extension beyond Colborne the beach splits into several branches at different levels. The fact that the beach ends in this way, both on the Canadian and the New York side, is a confirmation of the theory long ago advanced that the beaches were formed in an ice-dammed lake, and that the shore-line records on the northeast end disappeared with the melting away of the ice-dam against which they were made.

In Canada, Coleman finds the beach no longer horizontal, which is in harmony with the conditions in New York. The direction of greatest inclination is N. 20° E., and the amount of land-tilting which the inclination of the beaches suggests is 2 feet per mile from Hamilton to York, near Toronto; from York the quays, where the beach splits, 3.4 feet per mile; and from that point to the terminus of the beach 4.17 feet per mile. Coleman believes that 7,000 years is too short a time for the events since Lake Iroquois began, and that even 35,000 years are scarcely enough. The evidence upon which he bases this belief does not seem conclusive.

R. S. T.

AFRICA.

THE STANLEY FALLS—GREAT LAKES RAILROAD.—*Le Mouvement Géographique* (Nov. 27, 1904) says that this railroad, which is to be 75 miles long between Stanley-

ville and Ponthierville around the rapids which interrupt navigation in this part of the Upper Congo, is now completed for 22 miles, and it is expected that trains will be running over the entire road by the beginning of next year. The entire force of 4,000 workmen was obtained from the upper river, and under the superintendence of 70 whites they have learned rapidly to construct the roadbed and perform all other kinds of manual labour required in railroad-building. Temporary bridges of wood, to be replaced later by steel bridges, are being thrown over the streams. The ties for the roadbed will be entirely of wood supplied by the forests through which the route passes. Heretofore, on tropical Africa railroads, steel ties have been used, and the present experiment will be watched with interest. When the road is completed there will be uninterrupted steam transportation from the mouth of the Congo over 1,600 miles up the river.

NEW PORT ON THE RED SEA.—Mr. Corbett, the Financial Adviser to the Egyptian Government, reports that the railroad between the Nile at its confluence with the Atbara River and the Red Sea has been energetically pushed during the past year, and will, it is hoped, be completed early in 1906. The road will be designated as "The Nile–Red Sea Railway." The maritime terminus of the road will be at Sheikh el Barghout, a place some 30 miles to the north of Suakin. The official name of the new port will be Bandar Sudan. The port has the immense advantage over Suakin of possessing a commodious harbour, easily accessible to ships of heavy draught.—(Board of Trade *Journal*, Jan. 12, and Feb. 2, 1905.)

RUBBER-PLANTING ON THE CONGO.—According to *Le Mouvement Géographique* (No. 2, 1905), the Congo State is doing everything in its power to increase the rubber crop in that region. About 10,000,000 rubber vines have been planted since the Government began the regulation of the rubber industry. About half of these planted vines are cultivated by the personnel of the Free State and half by the Societies engaged in collecting rubber. The number of plants set out in 1904 is estimated at about 3,350,000. The Government requires that a certain amount of rubber-planting shall be done for every ton of rubber collected, and at the same time the law forbids the killing of vines to obtain the sap, and requires that the vine be merely tapped, so that the wound heals and the plant is still productive. Rubber from the districts of the Kasai and the Equateur commands the best price in the markets.

TRADE IN THE BRITISH EAST AFRICA PROTECTORATE.—The railroad between Mombasa and the Victoria Nyanza continues to stimulate the foreign trade of this Protectorate, in which commerce, only a few years ago, was inconsiderable. The report on the Protectorate for the year ending March 31, 1904 (*Africa*, No. 15, 1904), shows a total import trade of $3,021,835, of which about two-thirds were traders' goods or commodities imported for purchase by the natives. Cotton and, to a much less extent, woollen goods, provisions, rice, flour, and building materials are the largest articles in this trade. The exports amounted to $799,075, of which ivory and hides and horns supplied about two-thirds, grain, rubber and copra being also important.

The statistics show some falling off in trade as compared with the previous year, and this is due to the diminution of the ivory exports by about $40,000. For some years laws have been in force restricting the slaughter of elephants. The first effect was to put into circulation the hoards of buried ivory among the natives. Now that these supplies are practically exhausted, the existing laws, while preventing the destruction of elephants, hamper the ivory trade.

ASIA.

EXPLORATION OF WESTERN TIBET.—The London *Times* announces the arrival at Simla of the small party under Captain Rawling after its exploratory work in western Tibet (BULLETIN, Feb., 1905, p. 103). The sparse population gave the expedition a very friendly reception. Most of the inhabitants had never seen Europeans before and showed the greatest interest in the dress and appearance of the travellers. The Miriam La or Pass, the water-parting between the Sanpo (Brahmaputra) and the Sutlej, the large tributary of the Indus, was crossed at the end of November. It is 16,600 feet above the sea-level; but though snow was falling, the pass was easily surmounted. The Great Mansarowar Lake was carefully explored for the purpose of clearing up long-standing controversies regarding it. There was no flow at the outlet, and a rise of 3 feet would have been necessary for the stream to run. The Tibetans said that during the rains and when the snow melts (about 4 months in summer) there is an outflow. A hot-water spring was discovered a mile down the channel in the direction of the next lake, Rakas Tal, which was frozen over and had no outflow, though the natives say a stream ran from it in past years. The net result of the exploration is to place the source of the Sutlej much farther to the west than has been supposed. The British frontier was reached on Christmas Eve after crossing the Ayi-La, 18,400 feet high, amid falling snow. The Sutlej there flows through very broken country, and some of the ravines are 2,000 feet deep.

BAILEY WILLIS'S EXPLORATIONS IN EASTERN CHINA.—Mr. Willis, who received the grant for geological exploration in eastern China from the Carnegie Institution, has a report in Year Book No. 3 (1904) covering his work. He returned to the United States last summer. Some of his discoveries in eastern China were of remarkable interest. The glacial deposit of Cambrian Age, for example, is an almost unique discovery, equalled in interest in its way only by the extraordinary evidences of glaciation in southern Africa in Carboniferous times.

On the Yangtse River, in lat. 31°, as far south as New Orleans and not high above sea-level, the explorer discovered a large body of glacial till. It is unstratified, a mass of indurated clay and heterogeneous boulders, many of which show glacial polish and striæ. Prof. Chamberlin and other expert glacialists, to whom specimens have been submitted, pronounced them unquestionably of glacial origin. This deposit lies near the base of the Paleozoic system, beneath limestone which, in its lowest layers, contains pebbles from the till. The body of till is 170 feet thick. It demonstrates the existence of glacial conditions in a very low latitude in the early Paleozoic. Mr. Willis says:

> A similar occurrence at a closely-related Cambrian epoch has been reported from Scandinavia, but nowhere else has like evidence been found. This discovery takes a place among the unique facts of geological history, and the latitude, the conditions of occurrence and the conclusiveness of the evidence being considered, it will have great weight in reference to theories of climatic change.

Another far-reaching result in its effect upon broad geological theories is a contribution to the knowledge of mountains. Mr. Willis has extended the evidence that in the northern hemisphere the features of the earth's surface express recent activity of vigorous internal energy:

> In America, during the last fifteen years, through the study of topographic forms, it has been shown that the mountains of this continent are relatively recent features as compared with the rocks composing them, and owe their elevation to forces acting during the latest geologic periods down to the present. It was a point of prime interest in the comparative geology of continents whether the American methods of study applied to Asia would show that mountain growth had recently been active there also.
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> The observations of this expedition demonstrate clearly that the histories of mountains in North

America and China run closely parallel in time, in manner of development, and in resulting features of relief. The studies of Prof. Davis in western Asia point in the same direction, and the investigations of Profs. Penck and De Martonne in the Alps and Carpathians extend the generalization to central Europe. The conclusion that mountains are recent growths—indeed, are in some districts now actually growing—is far-reaching in effect on theories of the earth's internal energy and its manifestations.

CADASTRAL SURVEY OF SIAM.—The *Report* on the work of the Royal Survey Department of Siam for 1901–2 has been received. The most important work in progress is the Cadastral Survey of the cultivated alluvial land in the valley of the Menam River. The field party in that season numbered 154 men, of whom six were European officers. Their surveys reached the satisfactory total of 512 square miles. Much attention is being given to the training of Siamese in the various phases of the work, and, with some supervision their service is adequate. The main object of the Cadastral Survey is to afford the Government a perfectly reliable means of assessing the land-tax due by the owners or holders of the land, who are required to contribute to the revenue of the country. The survey is also of much importance to landholders, as they learn the exact areas of their holdings, and derive improved security from the issue of title-deeds based on the Survey. Three charts show the progress of the work.

MAP OF INDIA AND ADJACENT COUNTRIES.—The Trigonometrical Branch of the Survey of India sends a pamphlet (Professional Paper No. 1, Second Edition) concerning the map which is now being prepared on a scale of 1:1,000,000. The scale is in accordance with the recommendation of the International Geographical Congress, at its meetings in London, Berlin, and the United States. The projection adopted is a modified secant, conical projection, somewhat similar to that employed by Euler, in 1777, for his map of Russia. This projection was chosen because, as the area to be included embraces 36° of latitude and 80° of longitude, some form of conical projection was clearly indicated, and also because it was essential that all the sheets, 136 in number, should fit together to form one map. A certain amount of error will be unavoidable, but all the latitudinal distances will be correct, and the errors in longitude will not be of much importance. The map will fit into the scheme of making a map of the world on the uniform scale of 1:1,000,000. The scale is, of course, smaller than that employed in the actual field surveys. The completed map will show India a little west of the centre of the map, with Persia and eastern Arabia forming its western limits and the shores of eastern China at the eastern border of the map. Bokhara, Kashgar, and Peking will be on the northern edge, and the Horn of Africa and northern Sumatra on the southern border.

EUROPE.

ITALY'S DENSITY OF POPULATION.—Vol. 5 of the Italian Census taken on February 10, 1901, has a map in colours, showing the density of population in each of the political subdivisions of the kingdom. The most thinly-populated districts, among the Italian Alps and in the Grosseto and Matera Districts of the Peninsula, have less than forty inhabitants to the square kilometer. The mean density of population of the Kingdom is 113.28 to the square kilometer. The greatest density is in Naples and its environs, where there are 3,310 inhabitants to the square kilometer.

ITALIAN EMIGRATION.—The *Report* of the Italian Commission of Emigration for 1904 says that in two years the emigrants have numbered 527,000. More than half of them go to the United States; and the *Report* contains many communications from Italian consuls here for the guidance of the Emigration Office, which desires to

extend such aid and protection as is possible to these numerous outgoers. It is said, however, that this work of social charity is imposing a burden upon the country which is not easily borne in its present economic condition.

STROMBOLI.—In an article illustrated by eleven excellent, full-page half-tones, Dr. Tempest Anderson describes (Geographical Journal, Vol. XXV, 1905, pp. 123–138) recent changes in the crater of Stromboli, observed as a result of two expeditions to the island—one in 1888, the other in 1904. This crater, commonly called "the lighthouse of the Mediterranean" because of the frequency with which it is lighted by the volcanic fires, lies just to one side of the centre of the island of Stromboli, the northernmost of the Lipari Islands, just north of Sicily. The entire island is volcanic, and rises from the deep sea to a height of a little over 3,000 feet above sea-level. Including the submarine portion, it is a large and lofty volcanic cone. There is evidence of earlier, probably prehistoric, eruptions of great violence and magnitude; but the eruptions of the historic period have all been moderate, though there is considerable variation from time to time. The ordinary eruptions, which occur every few minutes, are so moderate that the process of eruption may be safely photographed from near at hand, as the author did, obtaining three pictures of different stages of the same eruption. Most of the eruptions bring forth ash, but during some lava pours forth and flows down the side. Occasionally eruptions are so severe as to affect the entire island; and the author gives a list of these, recorded since 1879.

The crater lies on the slope of the island, just northwest of the highest point, and about 600 feet below it. Below the crater is a steep slope, the Sciara, which descends from the crater to the sea, having an angle of about 35°, or the angle of repose of the volcanic ash which is erupted. With each eruption ash falls upon the slope, and some of it rolls into the sea; but, although the volcano has been in almost constant eruption during the historic period, the supply of ash has not been sufficient to build this slope up regularly, as in other volcanoes. The chief contribution of Dr. Anderson's paper is the description, with excellent illustrations, of changes which have occurred in the form and position of the crater between 1888 and 1904. Altogether, considering the length of time and frequency of eruptions, the amount of this change is exceedingly slight. R. S. T.

COAL RESOURCES OF THE UNITED KINGDOM.—The Royal Commission appointed in 1901 to inquire into the coal resources of the United Kingdom has issued its final report, which, on the whole, is of a reassuring character. Adopting 4,000 feet as the limit of practicable depth in working and one foot as the minimum workable thickness, the Commissioners estimate the available quantity of coal in the proved coal fields of the United Kingdom to be 100,914,668,167 tons, as compared with 90,207,285,398 tons estimated by the Coal Commission of 1871, notwithstanding the fact that 5,694,928,507 tons have been raised in the meantime. The excess is accounted for by the more accurate knowledge of the coal seams. It is also estimated that there are 39,483,000 tons of coal in the concealed and unproved coal fields. It is thought that in future thin seams will be worked more extensively than at present, and that the use of coal-cutting machines will facilitate this work. The coal consumption in the United Kingdom for 1903 was 167,000,000 tons.—(*Nature*, Feb. 2, 1905.)

THE RAINIEST DISTRICT IN EUROPE.—Dr. Kassner, of the Prussian Meteorological Institute, discusses "Das regenreichste Gebiet Europas" in *Petermanns Mitteilungen* for December, 1904. This district, to which attention was first directed

by Hann (*Meteorologische Zeitschrift*), 1890, 143; 1894, 189), on the Bocche di Cattaro, on the eastern shore of the Adriatic, rises abruptly several hundreds, and in places thousands, of meters above the sea. The region is that of the Karst. The rainfall data for twelve stations cover ten years (1891–1900), and for three stations cover at least five years. The short periods have been reduced to the longer period in the usual way. A chart showing the rainfall of the district indicates an increase inland and towards the north, until a mean annual rainfall of 177 inches is reached, which is found nowhere else in Europe. The district of this exceptionally heavy precipitation extends east and west; is about six miles long by three wide; increases in elevation from east to west, from 700 to 1,300 meters, while isolated summits rise some hundreds of meters above the general level. The station with the maximum of rainfall is Crkvice, situated at an altitude of 1,097 meters above sea-level, with a mean annual precipitation of 179.30 inches and a maximum annual precipitation of 234.72 inches in 1896. The rainiest season is the winter, *i.e.*, it accords with the general conditions of the Mediterranean climates. During the summer, in consequence of the general pressure distribution, the prevailing winds are northerly to easterly, *i.e.*, continental and dry. In winter the prevailing winds are southerly and moist. The seasonal distribution of rainfall at Crkvice is as follows: winter, 36%; spring, 26%; summer, 7%; autumn, 31%. It is interesting to note that at Cetinje, where the mean annual rainfall is over 100 inches, the summer is so dry that drinking-water is distributed by the pitcherful from a spring kept under the control of the authorities, while water used for other purposes is brought from a spring outside the town. The variations in the rainfall from month to month and from year to year are very large. At Crkvice, in 1896–97, the months of October, November, December and January each had over 40 inches of rainfall, giving a total in these four months of not less than 179.84 inches. The precipitation is chiefly in the form of rain, and is frequently associated with thunderstorms. Snow is heavy in winter, and in some years stations at considerable altitudes are often isolated for days together.

R. DEC. W.

SWEDEN'S FOREIGN COMMERCE IN 1903.—The official statement of Sweden's foreign trade in 1903 says that the imports were $148,702,800; exports, $122,713,800. The leading imports in order of importance were raw minerals, cereals, and flour, manufactured cottons, woollens and silks, yarns and meat products; timber formed more than one-third of the exports, other leading sales including lumber, fish, and other animal products and raw metals. The countries with which Sweden has long held the largest commercial relations are Great Britain and Ireland, Germany, and Denmark, three-fourths of the commercial movement of 1903 being with these countries.

EXPLORING THE VATNA JÖKULL.—The Scottish Geographical Society sent L. S. Muir and J. H. Wigner to Iceland last summer, and a brief account of their work has been published (*Scott. Geog. Mag.*, Nov. 1904). They crossed the great snow field of the Vatna Jökull, using *skier* to a considerable extent, especially in the soft snow. Hauling sledges loaded with tent and provisions, they started into the snow field at its northeast corner, and their progress, though never rapid, was fairly steady between August 13 and 25, when they reached solid ground on the southern edge near a fine glacier lake. Still keeping to the ice, however, they pushed farther west and were detained by bad weather for nearly a week in a large cave found in an old crater. A few miles farther west brought them off the ice on September 3. The total distance was about 80 miles in a straight line and as many more in side excursions. Four

virgin peaks were climbed, including Hàgöngur, the second highest measured peak. The area of the Jökull must be at least 4,000 square miles, or about one-tenth that of Iceland. The southern edge has this summer been carefully surveyed by a Danish staff, but the remainder, particularly the northeast, is still practically untouched.

The explorers say that the standard map by Dr. Thoroddsen, which is a splendid piece of work as regards the rest of the country, is very inaccurate in all relating to the Vatna Jökull. The Bruar Jökull, for example, extends for at least 20 miles farther north than is shown; the lake Graenalón is not entirely surrounded by ice, but touches dry land on two sides; the mountain Björn is not a slender ridge but a huge mass with a front to the Jökull of several miles; a number of peaks are incorrectly placed, and some just as important are not marked at all.

RUMANIA'S BLACK SEA PORT.—The port of Constantza, which the Rumanian Government, at large expense, adapted for the use of steamships several years ago, is growing rapidly in commercial importance. With its present steamship connections it provides the shortest route from central Europe to Constantinople, Asia Minor, and India. Ample harbour works and warehouses have been supplied, and the exports of grain and other commodities are constantly increasing. The exports in 1903 amounted to 401,095 tons, chiefly grain and flour, which are sent to Egypt, Spain, Italy, France, the Netherlands, Germany, and England. The imports were 56,262 tons, or nearly double the quantity of the previous year.—(*Export*, No. 5, 1905).

NEW PUBLICATION OF THE FRENCH ALPINE CLUB.—The Club Alpin Français has replaced *l'Annuaire* and *le Bulletin* with a monthly, the January number appearing on the 15th of that month. The name of this attractive magazine is "*La Montagne*, Revue Mensuelle du Club Alpin Français." The publications which it supersedes have been issued for many years. The Club, through its new monthly, hopes to widen its influence, which has so long been exerted in behalf of the exploration and enjoyment of mountains. Every thing relating to mountains, and particularly to the higher mountains, will come within its scope. The first number is finely illustrated from photographs.

OCEANOGRAPHY.

OCEANIC RESEARCHES.—At a meeting of the Challenger Society on January 25, the chairman, Sir John Murray, spoke on "The Relation of Oceanography to other Sciences" (*Athenæum*, Feb. 4, 1905). He pointed out that recent expeditions had made only inconsiderable alterations in the contour lines of the sea-bottom, published in the Challenger *Reports*, and was of the opinion that no great changes were likely to be made by the soundings of future expeditions. He believed that the great ocean basins had been practically unaltered through geological time, but that the continents (including a zone not more than 200 miles seaward of their present outline) had frequently altered their levels. He supported this belief by the fact that all known sedimentary rocks are of terrigenous character, to the exclusion of deep-sea material. The meteorology of mid-ocean, where the diurnal temperature range of the water is about 2° F., was contrasted with the meteorology of land-masses, where absorption and radiation are high and the diurnal atmospheric range may amount to 80° F. As an example of the far-reaching effects of the temperature, the speaker cited the range of animal variation where hot and cold currents are at war, amounting, in some cases, to over 40° F.; in such regions the animal death-rate is very high, and the dead organisms decomposing on the bottom start the formation of glauconite, a well-known constituent of sedimentary rocks. As another result of temperature, it

has been estimated that a tropical copepod lives twenty-four times as fast as an Arctic copepod in the same period of time. This may explain the predominance of specimens and paucity of species in the Arctic as compared with the tropical fauna.

PILOT CHARTS OF THE SOUTH ATLANTIC AND SOUTH PACIFIC OCEANS.—The U. S. Hydrographic Office intends to publish pilot charts of the South Atlantic and South Pacific Oceans, similar in scope to the present monthly pilot charts of the northern parts of these oceans. The charts will be published quarterly, instead of monthly, the first to appear being those for the South Atlantic. Successive seasonal charts of the South Atlantic will appear quarterly until the entire year has been included, after which a like series will be published for the South Pacific. The Hydrographic Office requests the co-operation of mariners in the preparation of these charts.

INVESTIGATIONS IN THE EASTERN PACIFIC.—Extracts from a letter by Mr. Alexander Agassiz to Fish Commissioner Bowers, dated Lima, Nov. 28, 1904, are printed in *Science* (Feb. 3, 1905). Mr. Agassiz joined the *Albatross* on Nov. 1 at Panama. She was under command of Lieut.-Commander L. M. Garrett, and Mr. Agassiz speaks in the highest terms of his efforts and those of the officers, crew, and scientific staff in the interests of the expedition.

The *Albatross* started at once towards Chatham Island in the Galápagos group, making a straight line of soundings from Mariato Point, the southwest corner of the peninsula on the west side of the Gulf of Panama. The deepest sounding (1,900 fathoms) was about 100 miles southwest of Mariato Point. The bottom then continued to show about 1,700 fathoms for nearly 200 miles, and then shoaled very gradually to 1,418 fathoms, about 80 miles from Chatham Island. The 1,000-fathom line was about 60 miles from Chatham Island. A short line was run south of Hood Island, revealing a somewhat steeper slope to that southern face of the Galápagos, over 1,700 fathoms being reached in less than 50 miles. The bottom then remained comparatively flat, attaining a depth of 2,000 fathoms about 100 miles farther south. This depth was carried eastward on a line from south of the Galápagos group to Aguja Point, near the northern end of Peru. The following results on this cruise from south of the Galápagos to Callao were obtained:

About half way to Aguja Point soundings increased to over 2,000 fathoms; remained at that depth to within 60 miles of the coast, when depth rapidly shoaled; soundings from Aguja Point southwest to 675 miles west of Callao showed depth increasing from 2,200 fathoms, 100 miles off the Point, to nearly 2,500 fathoms; running east to Callao, depth increased to about 2,600 fathoms; 80 miles off Callao over 3,200 fathoms found in the Milne-Edwards Deep; in two days spent in developing this Deep, soundings of 1,490, 2,845, 458, 1,949, 2,338, and 3,120 were found, showing great irregularity of the bottom in an area less than 60 miles in diameter.

Trawling, in charge of Mr. F. M. Chamberlain, began off Chatham Island, and was carried on at 20 stations. The pelagic collections were remarkably rich, and were especially noteworthy for the great variety and number of pelagic fish obtained inside the 300 fathom-line, from 300 to 650 miles offshore. Many of these fishes had been considered as true deep-sea fishes, to be obtained only when dredging between 1,000 and 1,500 fathoms or more. At one time the tow-net brought up from 300 fathoms, the depth being 1,752 fathoms, no less than 12 species of fish with nearly 150 specimens. Among the most interesting types found in less than 300 fathoms were *Stylophthalmus* and *Disomma*, both of which Chun considers as deep-sea fishes; also a species of *Eurypharynx*, obtained for the first time in the Pacific.

In the lines that were run across the great northerly current which sweeps along the coasts of Peru and Chile and is deflected westward at the easterly corner of the Galápagos Islands an unusually rich pelagic fauna was obtained at depths less than 300 fathoms. The finer tow-nets yielded immense collections of radiolarians, diatoms, and *Dinoflagellata*, many of which have been considered to live at great depth and upon the bottom. The number of diatoms found in these tropical regions is most interesting. They have been thought to be characteristic of more temperate and colder regions. The surface waters in places were greatly discoloured by their presence and bottom samples at depths of 1,490 to 2,845 fathoms formed a true infusorial earth, showing the influence of diatoms in the track of the great Peruvian current.

There was great variety in the hauls on successive days, showing how hopeless it is at sea to make any quantitative analysis of pelagic fauna and flora at any one station, within the influence of such a great oceanic current as the Chile and Peruvian stream.

Down to a depth of 2,200 fathoms or so the bottom was composed of *globigerina* ooze, its character being more or less hidden when near the coast by detrital matter which is drifted out to sea.

North of the Galápagos vegetable matter was found at nearly all the stations; and between the Galápagos and Callao such material was not uncommon in the trawl.

Six stations were occupied for the taking of serial temperatures, two at the western ends of the lines perpendicular to the coast across the Peruvian current, two in the centre of the current, and two at a moderate distance from the coast. These serials developed an unusually rapid fall between the surface and 50 fathoms, the temperature dropping from 71.7° to 59.2°; at 200 fathoms it was 51°; at 600 fathoms 40.7°, the bottom temperature at 2,005 fathoms being 36.4°. The temperature of the station in the central part of the current in 2,235 fathoms agreed with the western series. At the eastern part of the line in 2,222 fathoms with a bottom temperature of 36.4°, the surface being only 67°, there was a close agreement at 50 and 100 fathoms, the lower depths at 400 and 600 fathoms being from 1° to 2° warmer than the outer temperatures. A serial from the surface to 100 fathoms showed that the greatest drop in the temperature took place between 5 and 30 fathoms. The bottom temperature in nearly all the depths sounded was 36°, a high temperature for the depths attained.

Mr. Agassiz says that the changes made in the working apparatus of the *Albatross* have proved most satisfactory, From Callao the expedition was to proceed to Easter Island.

GENERAL.

Sale of Arctic Exploring Vessels.—The two Antarctic ships, *Terra Nova* and *Morning*, which relieved the National British Antarctic expedition on the *Discovery*, were sold at Portsmouth, England, on January 11. Mr. William Ziegler, of New York, bought the *Terra Nova* for $48,000, and she will be used by the relief expedition which will start next spring for Franz Josef Land to meet the Fiala party. The *Morning* was sold for $8,000. *Nature*, which gives this information, also says that the *Discovery* has been sold privately to the Hudson Bay Co. for $50,000.

Antarctic Meteorological Stations.—Permanent stations for carrying on meteorological observations in the far south are increasing rapidly in number, thanks to the admirable co-operation between the Argentine Meteorological Office, under its efficient and progressive Director, Mr. Walter C. Davis, and recent Antarctic expeditions notably the Scottish National Antarctic Expedition. The Argentine

Government has resolved to continue the station at Scotia Bay, South Orkneys, for a third year, and a new party, consisting of five men, has recently been sent there. A new house is to be built for the magnetic instruments. During the past summer (1904–05) the Argentine Government proposed to install a complete set of meteorological and magnetic instruments at the Penguin Islands. New Year's Island has also been equipped by Argentina. Cape Pembroke, on the Falkland Islands, has recently been equipped and inspected by Mr. W. S. Bruce, in co-operation with the British Meteorological Office. M. Charcot, of *Le Français*, is at present carrying on observations on the west side of Graham Land. Captain Larsen left Buenos Aires in November for South Georgia, where a permanent whaling station is to be established. This station is to be supplied with a complete set of meteorological instruments by Mr. Walter G. Davis. The next few years will doubtless witness a very rapid development of our knowledge of Antarctic meteorology.

R. DEC. W.

MEAN TEMPERATURES OF HIGH SOUTHERN LATITUDES.—Dr. Hann has recently contributed to *Nature* (Jan. 5, 1905) the results of a calculation made by him of the mean temperatures of the higher southern latitudes, using data obtained by the recent Antarctic expeditions. The preliminary table is as follows:

South latitude	50°	60°	70°	80°
Yearly temperature.....	41.9°	28.4°	11.3°	−3.6°
January "	46.9°	37.8°	30.6°	20.3°
July "	37.2°	18.2°	−8.0°	−24.7°

Mean temperature of both hemispheres:

	JANUARY.	JULY.	YEAR.	ANNUAL VARIATION.
Southern hemisphere	63.1°	50.5°	56.5°	12.6°
Northern "	46.4°	72.5°	59.4°	26.1°
Whole earth.....	54.7°	61.5°	57.9°	6.8°

The mean temperature of the southern hemisphere was previously determined (by Perrel and Hann) to be 59°, from data up to 55° S. The recent observations in higher latitudes show that the southern hemisphere is about 3° colder than the northern. (The above data were originally in Centigrade degrees. They have been converted into Fahrenheit degrees, and given to the nearest tenth by the compiler of this note.)

R. DEC. W.

GEOLOGICAL BIBLIOGRAPHY FOR 1903—*Bulletin* No. 240 of the U. S. Geological Survey is devoted to the Annual Bibliography and Index of North American Geology, Paleontology, and Mineralogy for 1903. This useful work is compiled by Mr. F. B. Weeks, Librarian of the Survey. Heretofore these bibliographies have been prepared solely from publications received by the library of the Survey, but the present issue records and indexes many geological papers that under the earlier practice were not noticed in the bibliography.

GLACIAL ORIGIN OF CIRQUES.—Two papers read before the International Congress of Arts and Sciences at St. Louis, and recently published in the *Journal of Geology* (Vol. XII, 2d, 569–588), deal with the question of the glacial origin of Cirques in high mountains, with especial reference to the Sierra Nevada. One of the papers is by Willard D. Johnson, who tells how, as a topographer called upon to map a portion of the high Sierras, he was impressed with the marked difference in topography there as compared with that of mountains in unglaciated regions. He

found the upper valleys broadly open, with steep sides, so characteristic of cirques, and the grades of the valley bottom in steps, some of which had a backward or up-stream slope.

The evidence suggested a process of basal sapping associated with former glaciation, but it seemed difficult to understand how a glacier resting against a rock slope, and drawing away from it, could undercut and cause the cliff to recede. Noticing the long crevasse which ran parallel to the amphitheatre wall a little way out on the ice—the *Bergschrund* of the Swiss mountaineer—it occurred to him that if this ran to the base of the ice it might offer an explanation of the puzzling phenomenon of cirque formation. Accordingly, he had himself lowered to the bottom of the Bergschrund, a depth of 150 feet, the last 20 or 30 feet of which had one wall of rock. Here was a chance for sharp frostwork, frequently repeated, with possibly daily alternations from freezing to thawing conditions, which would result in much "plucking," a veritable quarrying and excavation, by which the cirque head would be moved backward.

Since its first statement, in 1883, a large number of glacialists have applied Johnson's hypothesis in the field, and some have found it exceedingly useful in accounting for the topography of cirque regions, among these Dr. G. K. Gilbert, whose paper in the same number of the *Journal of Geology* applies the hypothesis to certain regions in the high Sierras. Gilbert finds numerous facts to substantiate the hypothesis, including the fact that the cirques in the region studied are steeper on the north side where running east and west, and on the east side where running north and south, these being the sides where the Bergschrund would be best developed, owing to the greater accumulation of snow in these protected situations. His paper is accompanied by a number of excellent pictures illustrating cirque conditions as applied to this hypothesis.

Gilbert, as well as others, is inclined to assign to glaciers an enormous power in cirque formation, cutting the great, deep amphitheatres and pushing the divides back. To others the vast amount of work postulated by the hypothesis seems incredible and to be accepted only when no other hypothesis can be considered possible. One result of such work of glacial excavation would be to supply an enormous quantity of rock fragments, both large and small, and cirque excavation on the scale proposed should be accompanied by great moraine accumulation ; but, so far as the reviewer is aware, such correlated deposits have not been observed. It is true that glacier streams remove a large proportion of the drift supplied by the melting ice ; but even mountain torrents would not remove the large fragments resulting from plucking, and these fragments should be especially abundant if, as Johnson says, "the line of most rapid advance in the glacier mass is from near the bed, at the rear, to the surface, near the front." R. S. T.

Effect of Debris in the Advance of Glaciers.—The reasons why the fronts of some glaciers are now retreating, others advancing, and why the rates of advance and retreat of glaciers vary, even in a single area, are now engaging the attention of numerous students of glaciers and glacial action. Doubtless the reasons for these variations are numerous and their interaction complex. One cause for difference in rate of ice advance or retreat, not ordinarily considered, is discussed in a recent paper by I. H. Ogilvie (The Effect of Superglacial Debris on the Advance and Retreat of Some Canadian Glaciers, *Journ. Geol.*, Vol. XII, 1904, pp. 722–743). His point is that under conditions otherwise identical glaciers thickly covered with rock debris, and thus in a measure protected from melting, will show a less measure of retreat than glaciers with less debris. Applying this to specific cases, he concludes that debris

covering is responsible for the advance, and, in fact, for the continued existence of the glaciers of the eastern Rockies.

In his description of individual glaciers, Ogilvie calls attention to the peculiar form of the front of the Victoria glacier, which does not face directly down the valley but diagonally across it, the ice-front facing northwest. This he interprets as the result of the direction at which the summer sun strikes the glacier, so that the form of its front is determined by the position of maximum melting, not by the direction of motion. R. S. T.

NEW PHYSIOGRAPHIC TERMS.—With the development of the scientific description and interpretation of land-forms authors have deemed it necessary to introduce a large number of new terms, most of which have died at birth, while some, being much needed and admirably adapted to the needs, have survived, and found permanent adoption into the geographic nomenclature. Prof. Salisbury (*Journ. Geol.*, Vol. XII, 1904, pp. 707–713) has found the need of three new physiographic terms: (1) topographic unconformity; (2) topographic adjustment, and (3) superimposed youth.

By "topographic unconformity" is meant "greater topographic age on the upper part of a slope and lesser topographic age on the lower part of the same slope, with a distinct line or belt of separation between the two." The less common case of younger topography above, and older topography below, would also be topographic unconformity. Streams that have adjusted their courses to the weaker strata Salisbury proposes to call in "structural adjustment;" streams whose profile is adjusted to existing conditions he would call in "topographic adjustment;" and streams not so adjusted he would call in "topographic non-adjustment." His third name, "superimposed youth," is applied to those conditions where an older topography has for some reason had its drainage features so changed that a system of young stream valleys is developed over, or superimposed on, the older topography. For example, the drift-sheet left by the continental glacier over a mature topography has, over wide areas, caused the development of younger streams in the drift, and even in the under rock, forming gorges, waterfalls, swampy tracks, and lakes in regions whose rock topography is distinctly too mature for such valley conditions. Salisbury suggests that if other causes for such superimposition should make it necessary, this condition resulting from glaciation might be called "glacially superimposed youth."

These new terms undoubtedly indicate a need which other physiographers besides Prof. Salisbury have felt. It is a pity, however, that less-cumbersome terms could not have been found to meet this need, for it is probable that many workers will prefer the circumlocution necessary, without definite names in the employment of such terms as "topographic non-adjustment" or "glacially superimposed youth.' It is, at best, difficult to secure the adoption of new terms, even when needed; and it is true that the ones which have been most thoroughly and acceptably adopted are those that are terse as well as descriptive. "Glacially superimposed youth" does not possess the merit of *peneplain*, *monadnock*, *grade*, or even of *river pirate*.

R. S. T.

THE CYCLONIC ELEMENT IN CLIMATOLOGICAL SUMMARIES.—The usual climatological summaries, which give the averages of the different elements by the year, or month, or day, do not emphasize the importance of the cyclonic and anti-cyclonic controls of our weather. The cyclonic and anti-cyclonic units are irregular in time and duration of occurrence; therefore, they are lost sight of in averages for definite periods. It is obvious that, in order to obtain a rational and vivid picture of the actual climatic conditions of places in the latitudes of the stormy westerly winds, we should, in some way, make the cyclonic and anticyclonic units a basis of averages.

A suggestion to this effect was contained in a paper read by Prof. R. DeC. Ward at the Eighth International Geographic Congress in Washington last September (*Suggestions Concerning a More Rational Treatment of Climatology*). Proceeding along very much the same lines, Dr. W. N. Shaw, F.R.S., presented a paper on *The Treatment of Climatological Observations*, before the Scottish Meteorological Society, in Edinburgh, December 6, 1904. The importance of the subject is so great that a summary of Dr. Shaw's paper may well be given here.

The practice of summarising observations in the form of weekly and monthly means and extremes is convenient, and the results for some purposes valuable; but since the actual weather of the British Isles does not arrange itself in such regular periods, a system of classification which deals with consecutive weekly or monthly divisions as homogeneous leaves something to be desired for certain problems. The distribution of barometric pressure from day to day may be adopted as a basis of classification, and the object of the inquiry, towards which Dr. Shaw's paper is a contribution, was threefold:

First, to combine the climatological data in such a way as to exhibit effectively the modifying influence of geographical position upon the general weather conditions of the locality. Second, to mark out in clear outline and give numerical expression to the specific characteristics of weather associated with distributions of pressure which may be regarded as typical. Third, to secure the co-operation of the observers at the normal climatological stations in filling the outline by putting together the data for their stations, as they are obtained, upon some plan organized by mutual agreement.

Six different types of pressure distribution may be distinguished in the British Isles:

I. S. E. Type.—A pressure distribution favourable for S. E. winds, or, according to the amount of incurvature, for E. winds.

II. S. W. Type.—For winds from S. W., or from some point nearer S.

III. N. W. Type.— " " " N. W., " " " " " W.

IV. N. E. Type.— " " " N. E., " " " " " N.

V. Variable Cyclonic Type, with the sequence of winds incidental to the passage of a cyclonic depression.

VI. Variable Anticyclonic Type, with the uncertain winds of the interior of an anticyclonic region.

This is, of course, not an exhaustive classification; indeed, each of the first four types may be conveniently subdivided into three, according as any station is in a position where the isobars are concave towards the low-pressure area, nearly straight, or concave towards the barometric maximum. So far the inquiry has extended to groups of stations in the districts named, and for the periods indicated in the following table, which gives the number of days in the different periods that might be referred to the several types:

TYPE.	ENGLAND N. W. 1896–1898. JANY.	JULY.	MIDLAND COUNTIES. 1897–1899. JANY.	JULY.	SCOTLAND E. 1897–1899. JANY.
I. S. E.	13	2	11	7	11
II. S. W.	40	35	32	19	43
III. N. W.	18	28	12	27	18
IV. N. E.	13	6	14	13	5
V. Variable Cyclonic	7	8	5	6	5
VI. Variable Anticyclonic	2	14	19	21	11

The data for the first two districts were for periods with only two years in common; but the January data for Scotland E., and for the Midland Counties of England, for one and the same period, showed a relative preponderance of the S. W. and N.W. types in the more northern district, and represented definitely a difference of climatic conditions for the two districts. The weather of each station in each group has been analyzed as regards rainfall, temperature, etc., and the results gave a definite measure of the peculiarities of any place or district for any type of weather. Altogether the method of distributing the observations according to weather types brought out a number of striking points which would be masked or obliterated if only weekly or monthly averages were used. The student of meteorology is able to get

a much clearer and more definite insight into the facts of meteorology by bringing to the numerical test a number of statements which have long been recognised in a more vague and general form.

Such work is necessarily laborious, but may be lightened by the co-operation of observers in the various districts. R. DEC. W.

A CHINESE MAP OF THE WORLD.—Dr. Ahlenius publishes a description of a map of the world that has been discovered in the University library at Upsala, Sweden. It was compiled by the Belgian Jesuit Ferdinand Verbiest, and bears his Chinese name, Nan-Hoei-Gin, and that of the Emperor, Kang-Hsi (1661–1722), by whom he was appointed Director of the Astronomical Academy in Peking. Verbiest had exceptional opportunities for acquiring information about the Chinese Empire, as he accompanied the Emperor on his journeys into Manchuria and Mongolia. His map is drawn on the stereographic projection, the degrees on the Equator being marked eastwards only, and not east and west from the first meridian through Peking. The material seems to be taken from Mercator, Ortelius, Thévenot, Sanson, Blaeu, and other cartographers. China, Manchuria, Mongolia, and Central Asia are laid down from Verbiest's own observations and investigations. The Amur River flows into the Fretum Anian, the mythical strait between Asia and America. Strange to say, New Zealand is represented as an island, though it was proved to be so only in 1769 by Cook. The nomenclature was apparently first put in a Latin form and then transliterated into Chinese (*Geog. Jour.*, Vol, XXIII, No. 6, p. 791).

POLAR REGIONS.

PEARY'S COMING EXPEDITION.—Commander Peary is now very busy with preparations for his return to North Greenland, to resume his efforts to explore the Arctic Ocean north of America and to reach the North Pole. His vessel, which is under construction at Bucksport, Me., embodies the best ideas yet evolved as to model, strength, and general fitness for polar navigation. She will be completed about May 1, and will come to New York to take on supplies, which will be in sufficient quantity for three years.

Peary will start for Greenland early in July, and expects to reach Cape Sabine in about a month. He intends to utilize the Arctic Highlanders more than has ever been done before, and will have a large number of dogs, upon which he will depend to haul his sledges over the frozen ocean. On his way up the Smith Sound and other channels he will probably plant supply depots at Cape Frazer, Cape Lawrence, and Lady Franklin Bay (Fort Conger). He hopes to start on his sledge journey over the sea-ice in February next, and to reach the pole and be back at his land-base some time in June, 1906.

RELIEF FOR THE FIALA EXPEDITION.—Mr. Champ, the secretary of Mr. Ziegler, whose North Polar Expedition, under the command of Mr. Anthony Fiala, has not

been communicated with since it entered the ice of Barents Sea nearly two years ago, has returned from Europe after completing arrangements for the relief expedition. Mr. Champ purchased the Dundee sealer *Terra Nova*, which took part in the British expedition that brought Captain Scott's party home from the Antarctic regions. He also chartered the *Belgica*, well known for her work in the Antarctic.

The *Terra Nova* will sail from Norway about the second week in May, and simultaneously the *Belgica* will sail from Iceland. Both vessels will be bound for Franz Josef Land, which was to be the base of Fiala's operations. By choosing two routes of approach to that archipelago it is hoped that one of the vessels at least may get through, last year's relief party having been unable to make way through the pack-ice of Barents Sea.

PERSONAL.

Prof. Raphael Pumpelly was elected President of the Geological Society of America at its recent meeting in Philadelphia.

Sir John Murray has received the Count Lütke medal of the Russian Geographical Society; and has also been elected Honorary Member of the Geneva Geographical Society in place of the late Sir Henry M. Stanley.

Dr. George P. Merrill was elected President of the Geological Society of Washington and Waldemar Lindgren and A. H. Brooks Vice-Presidents, at the twelfth annual meeting of the Society.

Mr. A. Silva White, formerly Secretary of the Royal Scottish Geographical Society, has been appointed Assistant Secretary of the British Association.

Prof. Dr. Josef Partsch, of Breslau, will succeed the late Friedrich Ratzel as Professor of Geography at the University of Leipzig, beginning his duties in the summer semester of this year.

OBITUARY.

Dr. Alpheus S. Packard, Professor of Zoölogy and Geology at Brown University, died on February 14 at the age of sixty-six years. His writings were very numerous, especially in the field of entomology. Among his works of special interest to geographers were "The Mammoth Cave and its Inhabitants," "Observations on the Glacial Phenomena of Labrador and Maine," "A Naturalist on the Labrador Coast," and many geological papers.

NEW MAPS.

AMERICA.

UNITED STATES.—Geologic Atlas of the United States. No. 114. De Smet Folio. South Dakota, 1904.

In the central part of the State, on the east slope of James River Valley, extending between Latitudes 44° and 44° 30′ N. and Longitudes 97° 30′ and 98° W. Area about 857 square miles. Its features are chiefly those of subdued glacial topography, the basins being shallow and widely separated, the swells very low, and most of the surface covered with glacial deposits. The quadrangle contains no valuable mineral or coal deposits, no streams furnish water the year round, and the artesian supplies are apparently declining.

No. 116. Asheville Folio. North Carolina–Tennessee. 1904.